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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/873,614      | 06/04/2001  | Paul S. Weiss        | P05185US1           | 4074             |

27407 7590 10/07/2003

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| EXAMINER |
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NGUYEN, KHIEM D

|          |              |
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| ART UNIT | PAPER NUMBER |
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2823

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/873,614

Applicant(s)

WEISS ET AL.

Examiner

Khiem D Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-29 and 33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 and 33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

The non-final rejection as set forth in paper No. (8) is withdrawn in response to applicants' amendments.

A new rejection is made as set forth in this Office Action.

Claims (1-29 and 33) are pending in the application.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9, 12, 14, 16-21, and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Marukawa et al. (U.S. Patent 5,627,090).

In re claim 1, Marukawa discloses a method for manufacturing nanostructure patterns comprising (FIGS. 1-5 and related text): Overlaying a multilayer organic molecule resist (FIG. 4: 5, 6) on at least a portion of at least one parent structure (FIG. 4: 3, 4) selectively deposited on a substrate (FIG. 4: 1); depositing a layer (FIG. 4: 7) over the at least one parent structure and in contact with at least a portion of the multilayer organic resist; and removing the multilayer organic molecule resist to leave a residual structure (FIG. 5: 7a).

In re claims 2 and 3, Marukawa discloses wherein the steps of removing the organic resist is electrochemical (col. 8, lines 29-53).

In re claim 4, Marukawa discloses wherein the steps of removing the multilayer organic molecule resist removes a portion of the deposited layer (FIGS. 1-5).

In re claims 5-8, Marukawa does not limit the residual structure to a specific structure, leaving the practitioners to design for a line, dot, or ring as meets her needs.

In re claim 9, Marukawa discloses wherein a first portion of the at least one parent structure ((FIG. 4: 3) is a first material and a second portion (FIG. 4: 4) of the at least one parent structure is a second material (col. 8, lines 2-10).

In re claim 12, Marukawa discloses wherein the substrate is silicon (col. 8, lines 16-22).

In re claim 14, Marukawa discloses wherein the layers of the multilayer organic molecule resist are connected with ions (col. 8, lines 2-39).

In re claim 15, Marukawa discloses wherein each layer of organic molecules is connected with  $\text{Cu}^{2+}$  ions (col. 8, lines 34-39).

In re claims 16, 17, and 18, Marukawa discloses smoothing the at least one parent structure (col. 8, lines 8-13) and is accomplished chemically or electrochemically.

In re claim 19, Marukawa discloses designing the at least one parent structure (FIG. 5: 3, 4) to result in the residual structure (FIG. 5: 7a) having a width less than a width of the at least one parent structure.

In re claim 20, whether the at least one parent structure to have a concave segment is inherently depends on the desired result one want to obtain.

In re claim 21, Marukawa discloses removing a portion of the residual structure (FIG. 5).

In re claim 33, Marukawa discloses designing the at least one parent structure to result in the residual structure being spaced more closely than the at least one parent structure (FIG. 5).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10-11, 13, 15, and 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marukawa et al. (U.S. Patent 5,627,090) as applied to claims 1-9, 12, 14, 16-21, and 33 above, and further in view of Hoechst AG (1999 Derwent Information LTD 1976-32210X) Dai et al. (U.S. Patent 6,232,706).

In re claims 10-11, it is well-known to one of ordinary skill in the art of making semiconductor devices to image the nano residual structure with scanning probe microscopy because at lower target concentrations, the nano residual structure could not be visualized with the naked eye.

In re claims 13 and 15, Hoechst discloses wherein the organic molecule resist is a mercaptoalkanoic acid and wherein each layer of organic molecules is connected with  $\text{Cu}^{2+}$  ions (Basic-Abstract). It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Marukawa and Hoechst to

enable the organic molecule resist of Marukawa to be formed and furthermore the resist is easily removed after etching or degreasing.

In re claims 23-25, Dai discloses smoothing the nano structure is accomplished by electrochemically (Abstract). It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Marukawa and Dai to enable the process of smoothing the residual structure of Marukawa to be performed and furthermore to obtain a smooth structure (Abstract).

In re claims 22 and 26-29, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to applied the techniques as taught by Marukawa above to overlaying a second multilayer organic molecule resist on the at least a portion of the residual structure; depositing a layer over the residual structure and in contact with at least a portion of the second multilayer organic resist; and removing the second multilayer organic molecule resist to leave a second residual structure to designing the residual structure to reduce the second residual structure size. Marukawa does not restrict the structure to one layer of organic resist and residual structure. The practitioners may use multiple iterations to form her devices as necessary.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703) 746-9179 for regular communications and (703) 746-9179 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.

September 29, 2003



Olik Chaudhuri  
Supervisory Patent Examiner  
Technology Center 2800